

# CHEMISTRY, MASTER OF SCIENCE (059)

## Program Coordinator

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The graduate program in chemistry provides a unique learning and research environment and many opportunities for students to develop as independent researchers. Graduate faculty members provide personal and professional mentoring in an intrinsically collegial, yet challenging graduate experience. Available resources efficiently support the learning needs and academic ambitions of students with varied backgrounds and interests. The program is designed to offer students comprehensive training in analytical chemistry, biochemistry, inorganic chemistry, materials chemistry, organic chemistry, and physical chemistry.

## Concentration(s)

- General Thesis (CTGN)
- Biochemistry Thesis (CTBC)
- Research Intensive Thesis (CRIT)

## Joint Undergraduate Master's Program (JUMP)

This degree offers a Joint Undergraduate Master's Program (JUMP) which provides academically outstanding students the opportunity to complete both an undergraduate and graduate degree in an accelerated timeframe. Contact the graduate program coordinator for additional information.

## Program Admission

In addition to Graduate Studies admission requirements, the Department of Chemistry requires:

1. Bachelor's degree in chemistry or equivalent including supporting courses in mathematics<sup>1</sup>
2. GPA in chemistry courses of 3.0 or greater (on 4.0 scale)
3. GRE general scores (Q+V) and Analytical Writing.<sup>2,3</sup>

<sup>1</sup> Exceptions to possessing a chemistry degree may be made for students with undergraduate degrees in chemistry-related areas (e.g. chemical engineering, pharmacy, pharmaceutical science, forensic chemistry). However, additional courses may be required and will be determined by the graduate program coordinator and/or the student's thesis committee.

<sup>2</sup> Scores from MCAT, PCAT, or DAT may be substituted for equivalent GRE scores.

<sup>3</sup> Although there are no formal minimum GRE scores, admission is competitive.

## Graduate Studies Admission

Please refer to the admission section (<http://catalog.wku.edu/graduate/admission/>) of this catalog for Graduate Studies admission requirements.

## Program Requirements (30-32 hours)

The program requirements include 12 hours of common courses and an additional 18 - 20 hours of coursework, depending on the concentration. The additional 18-20 hours of coursework must include a minimum of

two lecture courses at the 500 level, and no more than 12 hours may be taken at the 400G level.

All master's degree-seeking students must complete the following common courses:

Code	Title	Hours
<b>Required Courses</b>		
CHEM 516	Chemical Literature Review	2
CHEM 588	Research Proposal	2
CHEM 598	Graduate Seminar <sup>1</sup>	2
CHEM 599	Thesis Research/Writing <sup>2</sup>	6
<b>Total Hours</b>		<b>12</b>

<sup>1</sup> Requirements are to be satisfied according to the current departmental policy.

<sup>2</sup> Requirements are to be satisfied by preparing a thesis on the project chosen by the student and approved by the members of the student's graduate committee. Theses are to be prepared in accordance with the specifications established by Graduate Studies. A thesis grade will be given after the final thesis has been approved by the student's graduate committee and the department chair.

Master's degree-seeking students must select one of the following concentrations:

1. General thesis concentration
2. Biochemistry thesis concentration
3. Research intensive concentration (only recommended in special circumstances and with approval of a research advisor)

## General Thesis Concentration

Code	Title	Hours
<b>Required Courses</b>		
Select 3 courses from 3 of the 5 core areas below:		9
CHEM 531 or CHEM 435G	Advanced Analytical Chemistry Instrumental Analysis	
CHEM 562 or CHEM 535 or CHEM 446G	Advanced Biochemistry Analytical Biochemistry Biochemistry	
CHEM 520 or CHEM 420G	Advanced Inorganic Chemistry Inorganic Chemistry	
CHEM 541 or CHEM 540	Advanced Organic Chemistry Organic Reactions	
CHEM 550 or CHEM 452G or CHEM 450G	Advanced Physical Chemistry Physical Chemistry II Physical Chemistry I	
<b>Electives</b>		
Select 9 hours of graduate lecture courses *		9
<b>Total Hours</b>		<b>18</b>

\* Graduate lecture courses include the following:

CHEM 420G, CHEM 425G, CHEM 430G, CHEM 435G, CHEM 446G, CHEM 450G, CHEM 452G, CHEM 462G, CHEM 470G, CHEM 475G,

CHEM 490G, CHEM 520, CHEM 531, CHEM 535, CHEM 540, CHEM 541, CHEM 550, CHEM 560, CHEM 562, and CHEM 590.

## Biochemistry Thesis Concentration

Code	Title	Hours
<b>Required Courses</b>		
Select 3 courses from at least 3 of the 5 core areas below:		9
CHEM 531 or CHEM 435G	Advanced Analytical Chemistry Instrumental Analysis	
CHEM 562 or CHEM 535 or CHEM 446G	Advanced Biochemistry Analytical Biochemistry Biochemistry	
CHEM 520 or CHEM 420G	Advanced Inorganic Chemistry Inorganic Chemistry	
CHEM 541 or CHEM 540	Advanced Organic Chemistry Organic Reactions	
CHEM 550 or CHEM 452G or CHEM 450G	Advanced Physical Chemistry Physical Chemistry II Physical Chemistry I	
<b>Required Concentration Courses</b>		
CHEM 535 or CHEM 562 or CHEM 446G	Analytical Biochemistry Advanced Biochemistry Biochemistry	3
CHEM 467G	Biochemistry	3
CHEM 447G	Lab Biochemistry	2
<b>Electives</b>		
Select 3 hours of graduate lecture courses *		3
<b>Total Hours</b>		<b>20</b>

\* Graduate lecture courses include the following:

CHEM 420G, CHEM 425G, CHEM 430G, CHEM 435G, CHEM 446G, CHEM 450G, CHEM 452G, CHEM 462G, CHEM 470G, CHEM 475G, CHEM 490G, CHEM 520, CHEM 531, CHEM 535, CHEM 540, CHEM 541, CHEM 550, CHEM 560, CHEM 562, and CHEM 590.

## Research Intensive Thesis Concentration

Candidates for the research intensive concentration are required to complete 30 semester hours of graduate work, including 12 hours of coursework and 18 hours of research-related graduate work. Candidates must apply to the Department Graduate Committee in order to be considered for this concentration. As part of the concentration application, they must select a research advisor and meet with the committee to demonstrate they understand the requirements for this concentration. The Committee must consider factors such as previous research experience of the student, publication record of the student, and the research advisor's publication record when determining if the student can pursue this concentration. The student and advisor must submit a progress report to the Committee by the end of the second semester. If the committee determines there is insufficient progress towards research and publication, the student will be moved to the normal thesis concentration. A student in the Research Intensive Thesis concentration may also opt to pursue the Thesis option at the end of the first or second semester after consulting with their research advisor.

A student moving to another concentration within the first or second semester should be able to complete the requirements within the average two year period. A student who wishes to move to another concentration in the second year of graduate study must get permission from the

Graduate Committee and will probably require an additional semester of coursework to complete the degree.

Code	Title	Hours
<b>Required Courses</b>		
Select one of the following advanced lecture courses:		3
CHEM 520	Advanced Inorganic Chemistry	
CHEM 531	Advanced Analytical Chemistry	
CHEM 541	Advanced Organic Chemistry	
CHEM 550	Advanced Physical Chemistry	
CHEM 562	Advanced Biochemistry	
CHEM 596	Practicum Research Experience in Chemistry <sup>1</sup>	6
CHEM 595	Scientific Writing in Chemistry <sup>2</sup>	6
<b>Elective</b>		
Select one additional advanced lecture course above or one of the following:		3
CHEM 535	Analytical Biochemistry	
CHEM 540	Organic Reactions	
CHEM 560	Chemical Agents and Explosives	
CHEM 590	Material Chemistry	
CHEM 591	Material Chemistry Laboratory	
<b>Total Hours</b>		<b>18</b>

<sup>1</sup> Requirements are to be satisfied by conducting a research project under the direction of the student's research advisor. This course provides faculty-mentored research experiences and emphasizes skill based training for students. Bridging the gap between academic study and professional development, this course will help students to develop and enhance problem solving and communication skills. This course emphasizes mastery of advanced technical skills, independent of thesis research.

<sup>2</sup> Requirements include preparing and submitting two manuscripts based on their research to peer-reviewed journals under the guidance of the thesis committee. At least one paper must be accepted to receive credit and graduate.

### Joint Undergraduate Master's Program (JUMP) in chemistry.

The Department of Chemistry offers a Joint Undergraduate Master's Program (JUMP) which provides academically outstanding students the opportunity to complete both an undergraduate and graduate degree in an accelerated timeframe. See <https://catalog.wku.edu/graduate/enrollment/> or contact the chemistry graduate program coordinator for additional information.

This JUMP program allows students to start working toward their MS in chemistry while completing their bachelor's of science degree in chemistry. Undergraduate students admitted into JUMP may take graduate courses that count toward both undergraduate and graduate degrees. Up to 9 credit hours can be double-counted toward both degrees, and up to 12 hours of graduate courses can be taken while a student is completing the undergraduate degree. The key benefit of the JUMP program is that it allows students to earn a bachelor's and a master's degree in an accelerated timeframe. For more information, see <https://www.wku.edu/chemistry/>.

A student must be a chemistry or biochemistry major, and they must have completed at least one semester long research experience with a faculty

member in the Department of Chemistry to be considered for admission to the chemistry JUMP program. Note that admissions are competitive and dependent upon graduate program capacity.

The graduate courses accepted for the undergraduate program meet student learning outcomes for both the undergraduate and graduate programs linked in this JUMP program.

Consistent with the WKU JUMP policy, the Department of Chemistry proposes to allow no more than 9 hours from the following graduate CHEM courses to be used by students in the JUMP program toward their bachelor's degree: CHEM 420G, CHEM 435G, CHEM 446G, CHEM 450G, CHEM 452G, CHEM 520, CHEM 531, CHEM 535, CHEM 540, CHEM 541, CHEM 550, and CHEM 562.

Learning outcomes in the undergraduate program are fulfilled through core courses or restricted electives, and every graduate course listed above maps directly onto one of these learning outcomes. #Thus, all learning outcomes of the undergraduate program are maintained, but at a more rigorous level, through completion of these graduate courses.